CURRENT LITERATURE.

Plant anatomy.

Most teachers of botany have felt the need of a brief and comprehensive account of the tissues of plants. Such a book—"a brief outline of the elementary principles of anatomy"—it has been the aim of of Dr. Emily L. Gregory of Barnard College to prepare.[1] The book is of very convenient size and appeals to one on this ground as probably just what he is in need of. A glance at the table of contents strengthens the favorable impression. The subject is logically and comprehensively mapped out. It is divided into two parts, the anatomy of the cell and anatomy of tissues, the latter including not only tissues and systems but also an outline of the anatomy of the vegetative body of the thallophytes and "cormophytes." When the body of the book is reached, the favorable impression is somewhat modified. Amid much that is good, well-put, and correct, there is much that is crude, incorrect, or out of date.

The explanation of the molecular structure of "organic substance" —by which we suppose organized bodies are meant—is defective, but the first striking weakness is encountered in the discussion of the cell nucleus. Here, in the absence of any recognition of the nucleus as determining the cell and therefore the ascription of a plurality of nuclei to one cell, in the statement that "the chemical nature of the nucleus is the same as that of the cytoplasm," in the incompleteness of the account of mitosis, and in the absence of any reference whatever to the centrospheres, we see indications that these parts of the lectures were prepared some time ago and have not been brought up to date.

It is in this section too that we meet again that unseemly phrase, which grates so often upon the teacher's ear from the mouths of students, "some scientists claim!" With variations, "it is also claimed," "it is claimed by some authorities," "it is believed by most authorities," etc., this crude expression recurs again and again, until we are forced to believe that the author had relinquished all hope that her book would be considered "an authority."

Other points also need to be revised in the light of more recent knowledge, such as the structure and chemistry of the starch grain, the function of leucoplasts, the epidermal system, the sieve tissue, and the types of stem structure.

[1] Gregory, Emily L.—Elements of plant anatomy. 8vo. pp. viii+148. figs. 64. Boston: Ginn & Co. 1895.

Of some statements we can find no explanation except that the author has mistaken the facts, but we cannot undertake to give illustrations of these. There is certainly confusion regarding the secondary bast fibers, that is those produced by the secondary meristem of the bundle, and the similar tissues arising from the pericycle. We cannot understand in what sense "tracheids are to the ducts what the accompanying [i. e., companion] cells are to the sieve-tubes of the phloem, namely assisting cells." If mono- and dicotyledonous types of stem structure are distinguished, is it not a serious objection to such a distinction to have to say regarding monocotyledons which undergo secondary thickening that "the stems which do admit of such increase may be considered as having changed from the mono- to the dicotyledonous type?" And this is unintelligible: "In general it [the cambium ring] may be said to be formed either by the intercalation of new bundles, or by the formation of interfascicular cambium." Is this "what is commonly called bark, namely all that portion of the stem outside the inner periderm?"

So we turn from the book with regret, wishing it were better, and hoping that by a careful revision Dr. Gregory will be able to furnish us a much needed text-book. It ought to be suggested to the publishers, also, that they seek to emulate the delicacy and softness of the illustrations in Strasburger's works, and avoid the coarse harsh style in which they have produced these.

Botany for pharmacists.

The book before us[1] is really a double one whose back title, side title, title pages and sub-titles are rather puzzling. The confusion, doubtless due to an inexperienced publisher, resolves itself thus: Drs. Rusby and Jeliffe have written for a pharmaceutical journal a series of articles, which are reprinted apparently from the original setting (as the pages are double columned), treating of the anatomy of plants from the point of view of the pharmacist. Dr. Rusby writes of gross structure and Dr. Jeliffe of histology.

Dr. Rusby, after a good introduction of five pages, devotes nearly two-thirds of his 100 pages to the flower, fruit, and seed, leaving only thirty-five for the other plant parts. The greater part of this section is a running glossary with only a cursory account of the morphology and physiology of the organs. In the "anthology" a confusing at-

[1] Essentials of vegetable pharmacognosy; a treatise on structural botany designed especially for pharmaceutical and medical students, pharmacists and physicians. Part I, The gross structure of plants, by Henry H. Rusby. Part II. The minute structure of plants by Smith Ely Jeliffe. 8vo. pp. vi + 150. figs. 560. New York: D. O. Haynes & Co. 1895.

tempt is made to present the modern view of the pollen-grains and ovules, as these sentences will show:

"These correspond, though of the other sex, to the macrospores which we have found the pistillate flowers to produce, and they are called microspores, in flowering plants called pollen-grains."

"If as in the alder, pistillate flowers and staminate flowers, or, otherwise stated, spores of both sexes, are produced by the same plant, it is monœcious.

The following account of the morphology of the anther, as well as the succeeding quotation regarding the pollen-grain, seem to indicate that the author has scarcely understood the homologies involved.

"Its origin from the leaf assumes the curving forward and inward of the margins of the blade to become attached to the face of the midrib, producing two thecæ, and the production of a secondary or "false" partition separating each theca longitudinally into two locelli."

"The pollen-grain consists of a highly hygroscopic mass of tissue, partly vital and partly nutritive."

The excellent illustrations, new, accurate, and clear, deserve high praise. Had they been numbered in type and an explanation or at least the names of each been given, it would have been a decided improvement.

Dr. Jeliffe's "outline of practical plant anatomy," as one title page calls it, is a greatly condensed account of the tissues, classified essentially as by Tschirch in his *Angewandte Pflanzenanatomie*, and illustrated by many cuts from that work. It is difficult to see how one who can write thus about the cell wall and the vacuoles can be fitted to prepare even an outline of plant histology:

"The lining membrane is called the cell wall. It is not always present, as in many one-celled plants, as yeast, nor is to be found in the youngest growing parts of the plant, as in the apices of stems and roots, nor in the immature pollen-grains."

"After the cells commence to grow portions of the cytoplasm are consumed in the building up of the plant, and small vacuoles appear in it."

"Vacuoles and other spaces left by the retreating protoplasm."

And this difficulty is increased when we find him defining "respiratory tissues" as "those which enable the plant to take in food from the atmosphere in the form of carbon dioxide and to give off oxygen and watery vapor."

While the authors' work is faulty in many particulars it is not easy to find any in which the publisher's is what it ought to be, if we except paper. The clumsy binding, the old brevier type in double columns loaded with capitals, the cuts numbered in two series while the pages are numbered consecutively, and the want of an index conspire to repel further acquaintance.

North American Cactaceæ.

Our North American species of *Cactaceæ* are now brought together[1] as a result of the studies of Dr. John M. Coulter.

The first part (no. 2, published in June, 1894) contained the genus *Cactus* (Mamillaria) and its small outliers, *Anhalonium* and *Lophophora;* the second part (no. 7, published in April, 1896) completes the work by presenting *Echinocactus*, *Cereus*, and *Opuntia*. The revision is called "preliminary" because confused and inadequate material, a badly tangled synonymy, and paucity of types could result in nothing else. It is also preliminary in the sense that it professes to do little more than to bring together the widely scattered material, sift it so far as possible, and thus lay the foundation for more elaborate study. It is probable that no group among the higher plants presents greater difficulties in the way of classification, both on account of the meager and fragmentary material, and also on account of the almost entirely unknown possibilities of variation. Having been very largely cultivated in Europe as well as America many modified forms have been produced, many garden species and varieties have been described, and these have vastly complicated the work of revision. It is certain that very many forms described, both in the revision before us and elsewhere, will be found undeserving of specific and varietal rank, but this can be discovered with certainty only by long continued and patient scientific cultivation. In few families are there such poorly defined generic lines, even our well-known North American genera exhibiting most puzzling intergrading forms. It may be safely said that in Cactaceæ there are few good species, as that term goes, and no genera. The monographer had a rare opportunity in his access to Dr. Engelmann's types and notes, many of the latter being first published in the present revision. If the North American species north of the Mexican boundary were the only ones concerned, some reasonable degree of certainty might be reached, but the well-nigh unknown cactus-flora of Mexico constitutes a necessary and unexplored background. Taking up the three genera of the *Contribution* just issued, we find *Echinocactus* containing fifty-two species and varieties, thirty-six of which are found within the United States; *Cereus* eighty-two species and varieties, of which twenty-nine are north of the Mexican boundary; and *Opuntia* 101 species and varieties, seventy-nine of which are found within our borders. It should be said, however, that this well represents only the forms found within the United States, as only such Mexican forms are included as could be examined. Numerous

[1] Contributions from the U. S. National Herbarium **3:** 91–132, 355–462.

new species indicated in Dr. Engelmann's manuscript notes and of the monographer are described, more by way of recording forms than with any expectation that they will stand the test of future investigation. Artificial keys supplement the presentation of each genus which will serve a useful purpose in recognizing material which is generally incomplete. It is hoped that this bringing together of our material in convenient shape will provoke investigation, especially since competent observers are multiplying in the cactus regions; and that the next revision will show large progress in our knowledge of this extremely interesting and perplexing group.

The bacteria.

In Engler & Prantl's *Die natürlichen Pflanzenfamilien*, the Schizomycetes or bacteria are united with the Schizophyceæ or fission-algæ into the Schizophyta. The first class has recently been issued as Lieferung 129, and is from the pen of Prof. W. Migula, the well-known bacteriologist.

The difficulties to be surmounted in a systematic treatment of the bacteria are well recognized. Their simplicity of structure and variability of function together with imperfect descriptions, the majority of which have been recorded by non-botanical bacteriologists and the almost interminably confused synonymy make an exhaustive treatment of this group practically impossible from a taxonomic standpoint.

Numerous systems of classification have been proposed from time to time, but many of these have been tentative, being based on convenience more than on natural affinities. Some have been constructed purely from the morphological standpoint, while others have assigned to functional characters a value equal to that of form.

Migula has prefaced his system with an exceedingly well written and concise account of the morphology and physiology of the bacteria. Reference is also made to geographical distribution, the relationship of the bacteria to closely allied groups, and some very pertinent observations on the subject of bacterial nomenclature. He deprecates the introduction of generic terms that are based on some biological property such as *Halibacterium* Fischer, *Photobacterium* Beyerinck, *Nitrosomonas* and *Nitromonas* of Winogradsky, inasmuch as these groups are well defined morphologically and can be satisfactorily arranged under the usual laws that govern systematic classification.

He further objects to the attempt to translate into Latin the species diagnosis and use it for a species name, as it is not only unwieldy in practice but is opposed to the present accepted taxonomic principles For instance, *Bacillus fluorescens liquefaciens minutissimus* Unna and

similar titles are at variance with the accepted principles of the binomial nomenclature.

Migula's classification is based primarily on morphological and developmental differentiation, and in the selection of these characters he uses those that are the most permanent, subordinating the more transient, such as the presence and distribution of cilia, to lesser divisions.

The following synopsis gives the salient features of his system:

I. Cells when isolated spherical, not elongating before cell division.
   Cell division in 1, 2 or 3 planes. . . . . 1. *Coccaceæ.*

II. Cells cylindrical (short or long) dividing in only one plane, and elongating before division.
   a. Cells straight, rod-like, devoid of sheath, immotile or motile by means of cilia, ... 2. *Bacteriaceæ.*
   b. Cells curved, without sheath, ... 3. *Spirillaceæ.*
   c. Cells surrounded with a sheath, . . . 4. *Chlamydobacteriaceæ.*
   d. Cells without sheath, united into filaments, motile by undulating membranes, ... 5. *Beggiatoaceæ.*

The division of genera in the different families is likewise accomplished by the use of morphological characters such as the presence or absence of locomotor organs, protoplasmic inclusions like sulfur grains and, in the more specialized groups, the arrangement of cell filaments. Biological characters such pathogenicity, chromogenesis and zymogenesis are only used to differentiate related groups in various genera.

No attempt is made to classify all of the species already recorded, but a brief description is appended of a few representative forms under each group. The system will doubtless be regarded as the most successful attempt that has yet been made to outline the classification of this group on morphological lines.

It certainly represents an advance over any of its predecessors, and is superior to the contemporaneous systems that have been suggested within the last few years. The prestige of the publication of which it forms a part will doubtless strengthen its authority and lead to its adoption by botanical bacteriologists.—H. L. RUSSELL.

Minor Notices.

The authors have recently issued decades XVII and XVIII of "*Hepaticæ Americanæ*, prepared by L. M. Underwood and O. F. Cook." It has been three years since the last decades were issued, and we are pleased to find that there has been no abatement of the original plan to issue exsiccatæ of all the North American species. There are nine

contributors, beside the authors, to the present score of numbers: C. V. Piper, D. H. Campbell, F. C. Straub, M. A. Howe, A. W. Evans, E. L. Rand, W. C. Werner, J. Macoun and A. B. Langlois. The species and place of collection are as follows: *Anthoceros laevis* L. and *A. Hallii* Aust. from Washington; *A. fusiformis* Aust., California; *A. Carolinianus* Michx., Florida; *Riccia nigrella* DC., California; *Aytonia erythrosperma* (Sull.) Underw., Washington; *Cyathophora quadrata* (Scop.) Trevis., New York; *Lepidozia sphagnicola* Evans, Connecticut; *Nardia Macounii* Underw. *n. sp.*, Washington; *Chiloscyphus polyanthos rivularis* Nees, California; *Plagiochila Virginica* Evans, District of Columbia; *Jungermania Novæ-Cæsareæ* Evans, New Jersey; *Cephalozia fluitans* (Nees) Spruce, Maine; *C. Turneri* (Hook.) Lindb., California; *Porella pinnata* L., Indiana; *Frullania Selwyniana* Pears., Ohio; *Lejeunea Macounii* Spruce, British Columbia; *L. serpyllifolia* (Dicks.) Lib., Florida; *Kantia Sprengelii* (Mart.), Louisiana; and *Blepharostoma nematodes* (Aust.), Florida.